# Exercise: Image and Video Processing

Sheet 7 – Object Recognition

Exercise 1 – Shape based object recognition

1. Based on the outer shape of an object, you want to classify an object in a video automatically. How do you proceed?

2. Why do you need to parameterize (sample) the shape of an object first?

3. We have already segmented an object (assume that the object pixels are black, and that the background is white). You want to describe the outer shape of the object with 100 pixels. Describe an algorithm to parameterize this object.

4. Why is it necessary to describe the shape of an object with planar curves instead of using an explicit (functional) definition?

5. Name the major steps to create a curvature scale space image.

6. Name two reasons why different objects may result in very similar features (similar peak positions in scale space images).

7. Explain the idea of mirrored contours.

8. Calculate the difference between the red and the blue scale space image:
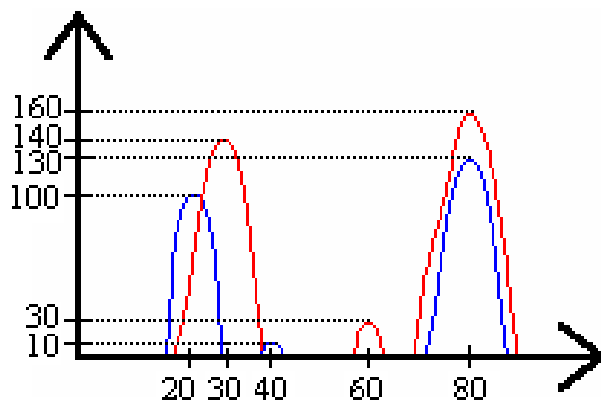
9. The shapes of most objects change continuously in videos. Name an approach to get a reliable classification.

10. Canonical views of objects should be used as reference objects. Why?

Exercise 2 – MPEG-7 Visual Descriptors

Read the documentation „The MPEG-7 Visual Standard for Content Description – An Overview". Explain the following terms and answer the questions:

1. Which categories of visual descriptors are specified in MPEG-7?

2. Why do we need visual descriptors?

3. What is the goal of MPEG-7? What is standardized, and what is not standardized?

4. Name the steps to create a standard.

5. Name advantages of color based features to describe objects.

6. Describe the following descriptors:

   - Scalable Color Descriptor

   - Dominant Color Descriptor

   - GoF/GoP Color Descriptor

   - Non-Homogeneous Texture Descriptor

   - Motion Activity Descriptor

   - Camera Motion Descriptor

   - Motion Trajectory Descriptor